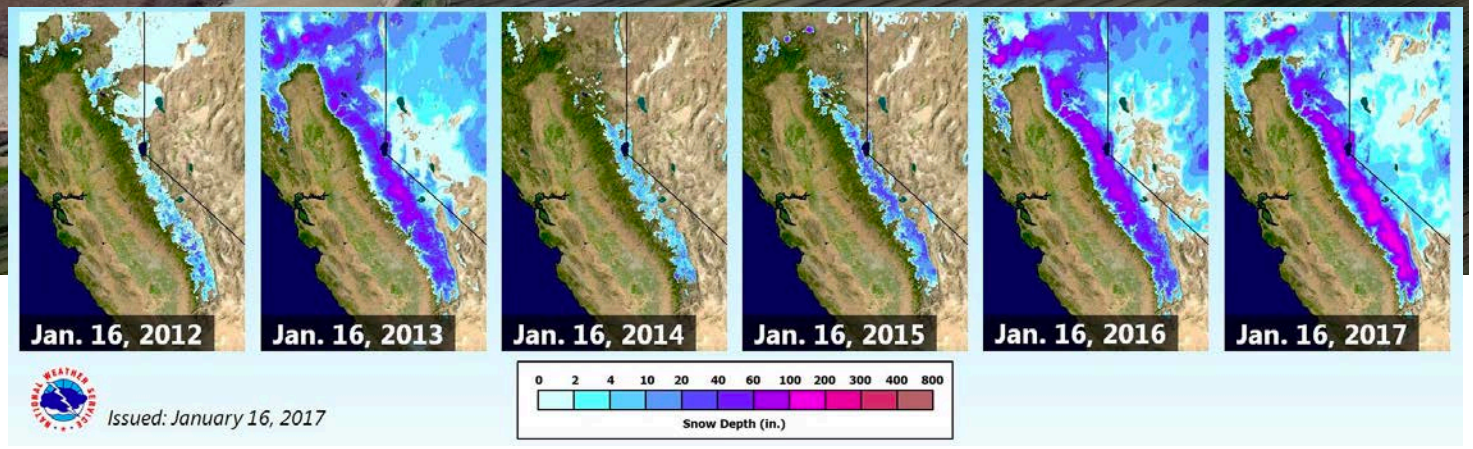
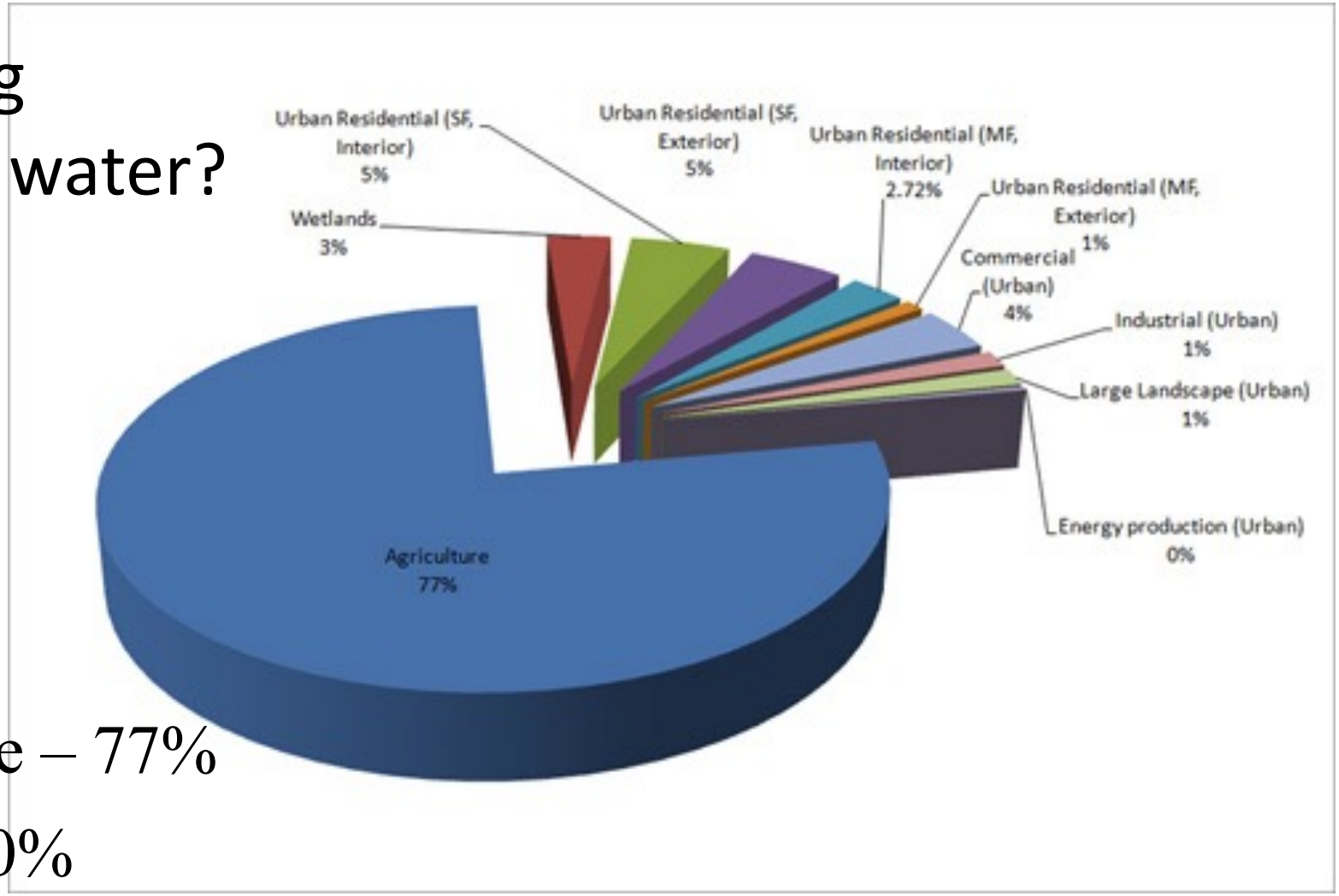
Drying Up: Agriculture, Pollution, and Politics

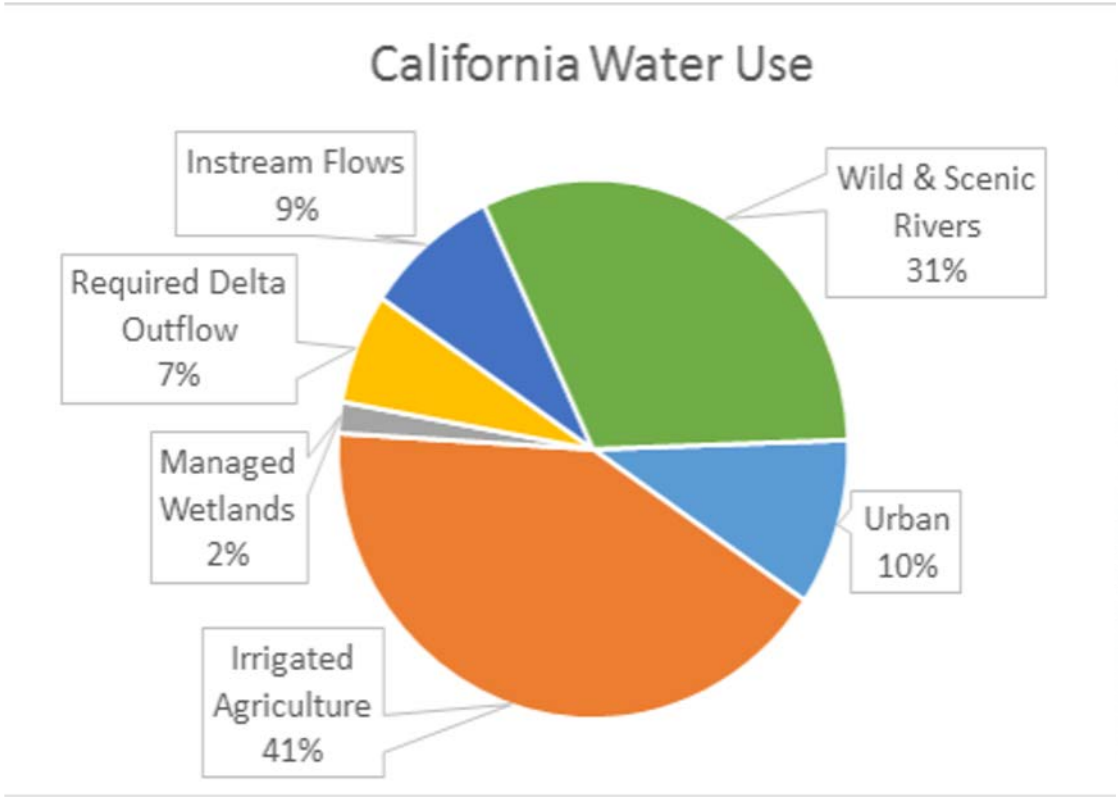


Who's using California's water?



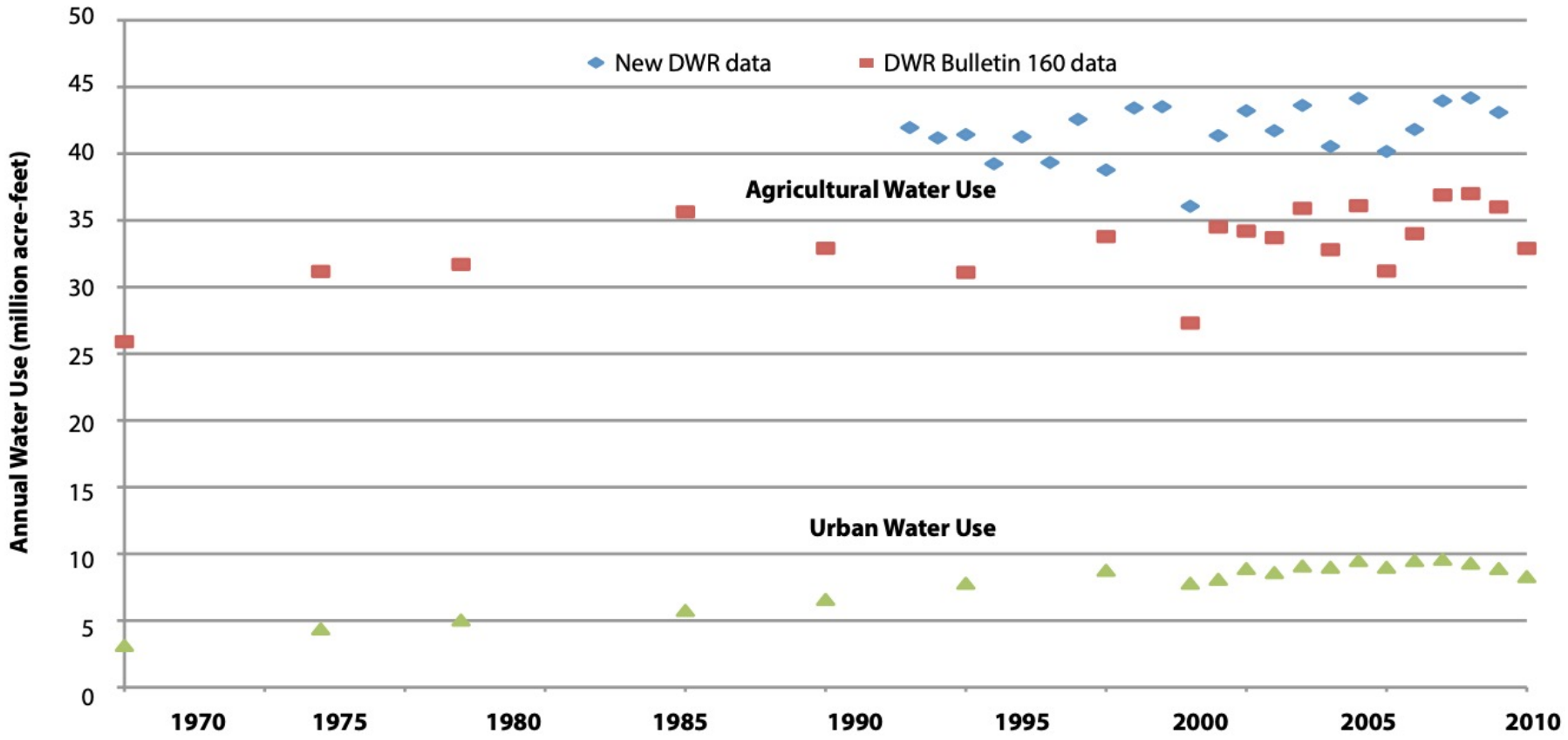
- Agriculture – 77%
- Urban – 20%

Agriculture & Irrigation in California



Who is using California's water

Figure 1. Agricultural water use, 1960–2010



Sources: DWR (1964, 1970, 1974, 1983, 1987, 1993, and 2014) and Orang et al. (2013).

Agricultural Water Pricing

<u>Central Valley Project</u>:

Largest U.S. Federal Bureau of Reclamation water resource Project.

Authorized in 1935, now delivers up to 7.4 billion m^3 of water each year – 85% for agriculture.

Agricultural Water Pricing

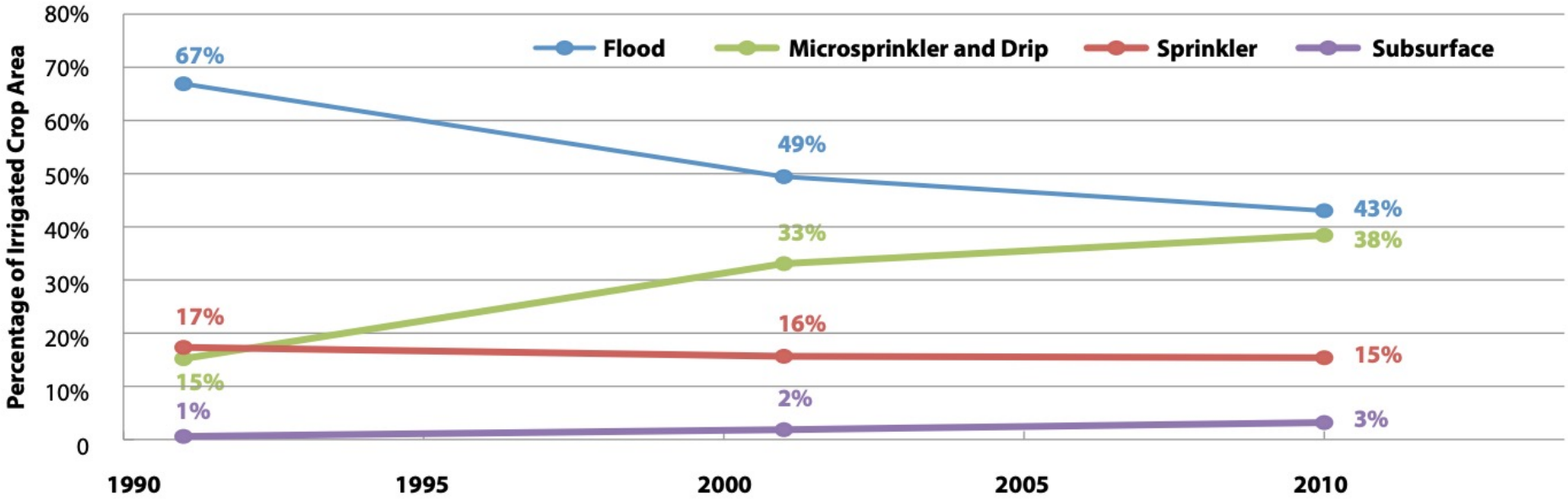
Central Valley Project:

Ranges significantly depending on water district – approximately $250 - >$600 per af.

Only 11% of cost has been repaid.

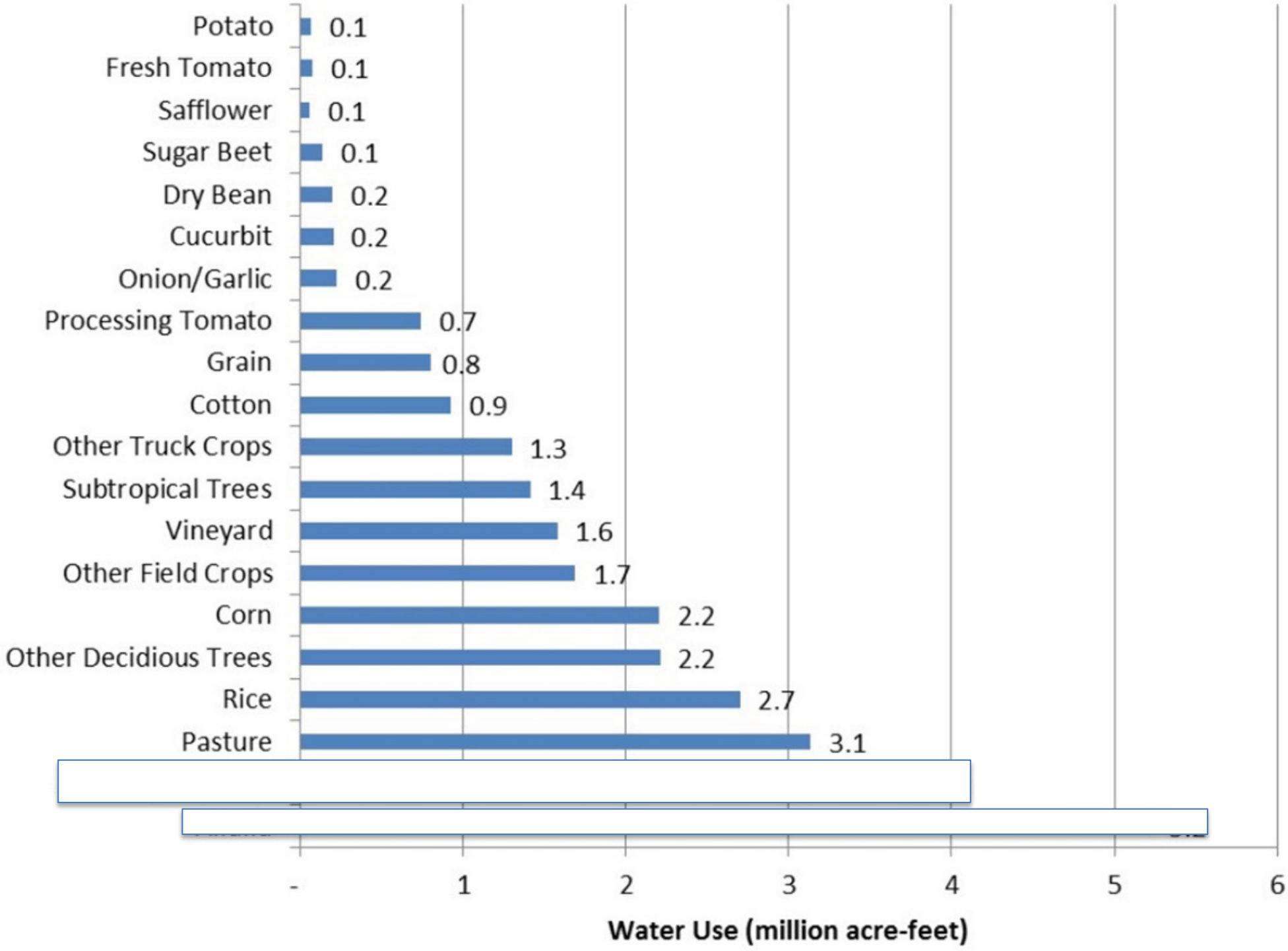
How we irrigate…

California Irrigation Methods



Note: These data do not include rice acreage, which is grown using flood irrigation. If rice acreage were included, the percent of crop land using flood irrigation would be higher.

Source: Tindula et al. (2013).


Potato 0.1
Fresh Tomato 0.1
Safflower 0.1
Sugar Beet 0.1
Dry Bean 0.2
Cucurbit 0.2
Onion/Garlic 0.2
Processing Tomato 0.7
Grain 0.8
Cotton 0.9
Other Truck Crops 1.3
Subtropical Trees 1.4
Vineyard 1.6
Other Field Crops 1.7
Corn 2.2
Other Decidious Trees 2.2
Rice 2.7
Pasture 3.1
- 1 2 3 4 5 6
Water Use (million acre-feet)

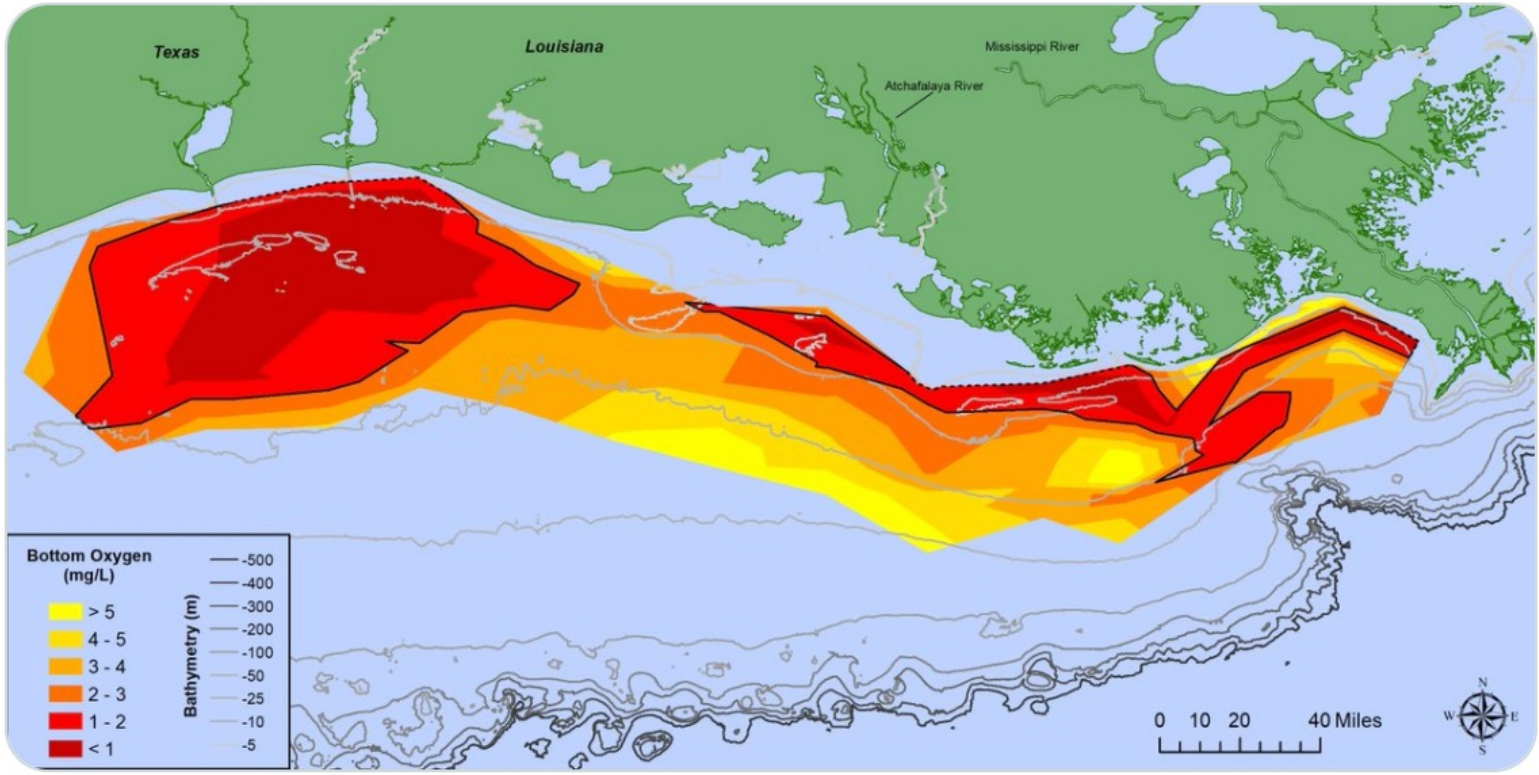
Agricultural Runoff

Pollution Issues

Lake Erie
2011

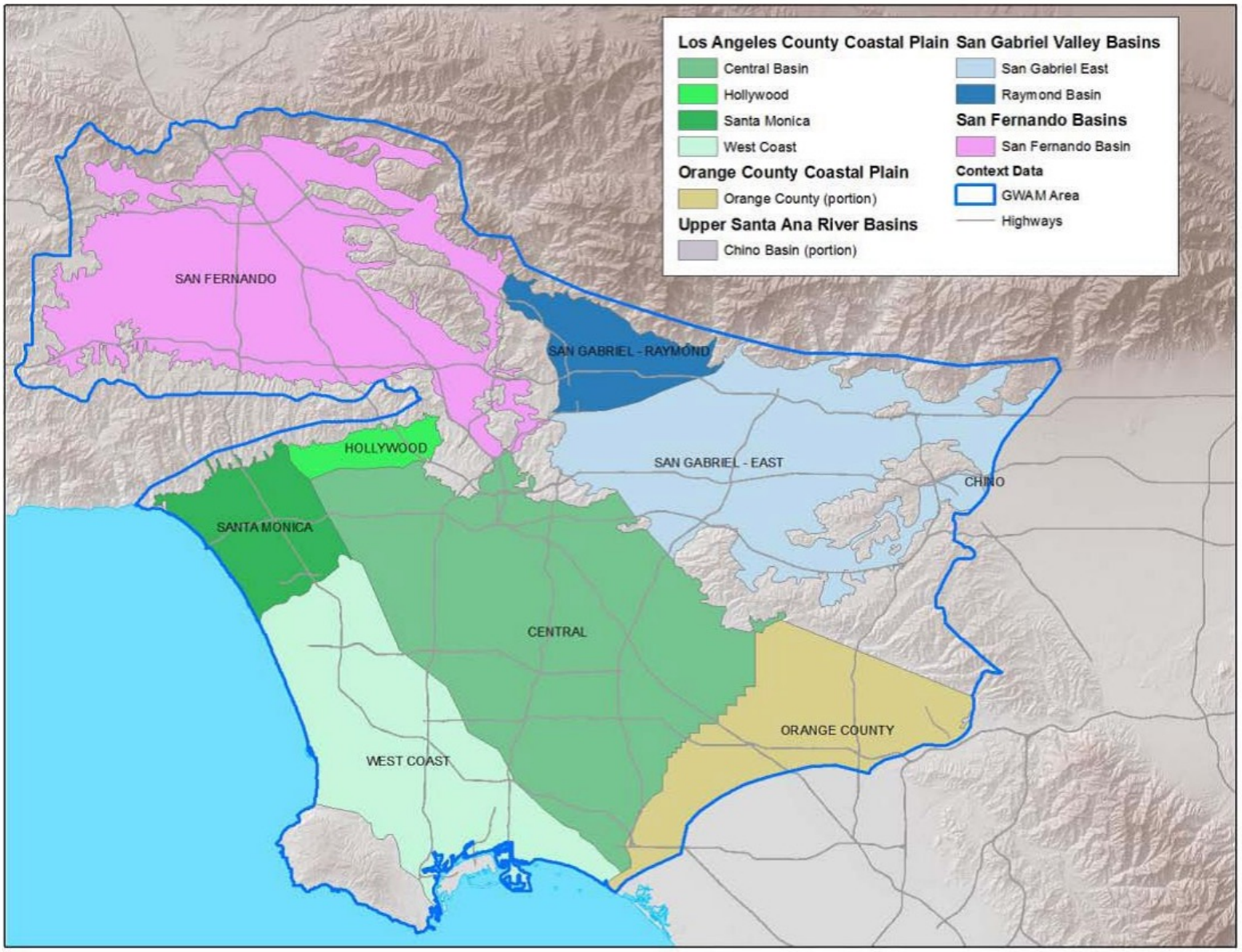
NOAA Ocean Today
@NOAAOceanToday

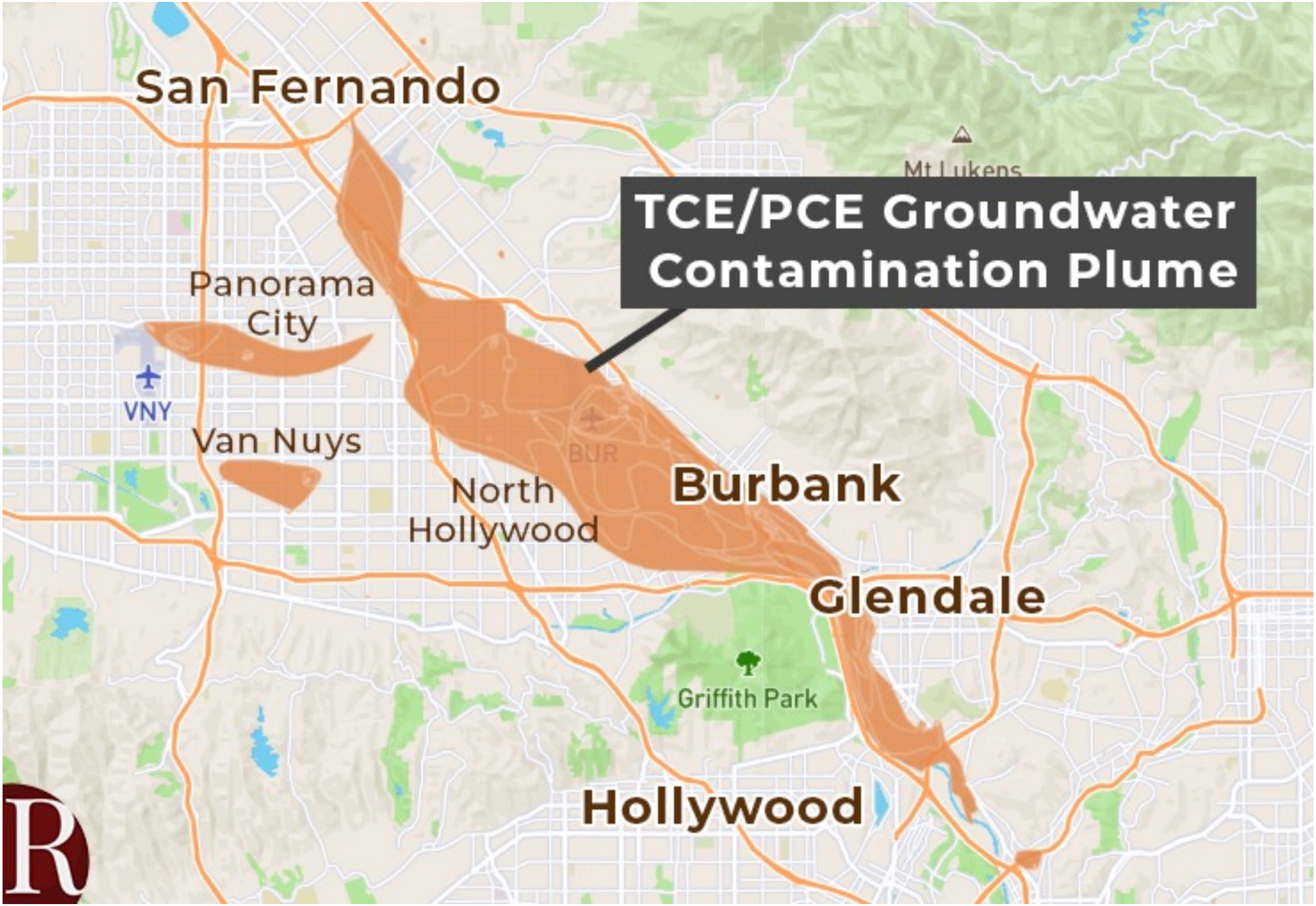
NOAA-supported scientists report that this year's Gulf of Mexico "dead zone" is ~6,334 square miles, or equivalent to more than 4 million acres of habitat potentially unavailable to fish and bottom species. oceantoday.noaa.gov/deadzonegulf-2...



10:28 AM · Aug 3, 2021 · Twitter Web App

Los Angeles Groundwater Basins:




San Fernando
Mt Lukens
TCE/PCE Groundwater Contamination Plume
Panorama City
VNY
Van Nuys
BUR
North Hollywood
Burbank
Glendale
Griffith Park
Hollywood

WATER
IS A HUMAN
RIGHT

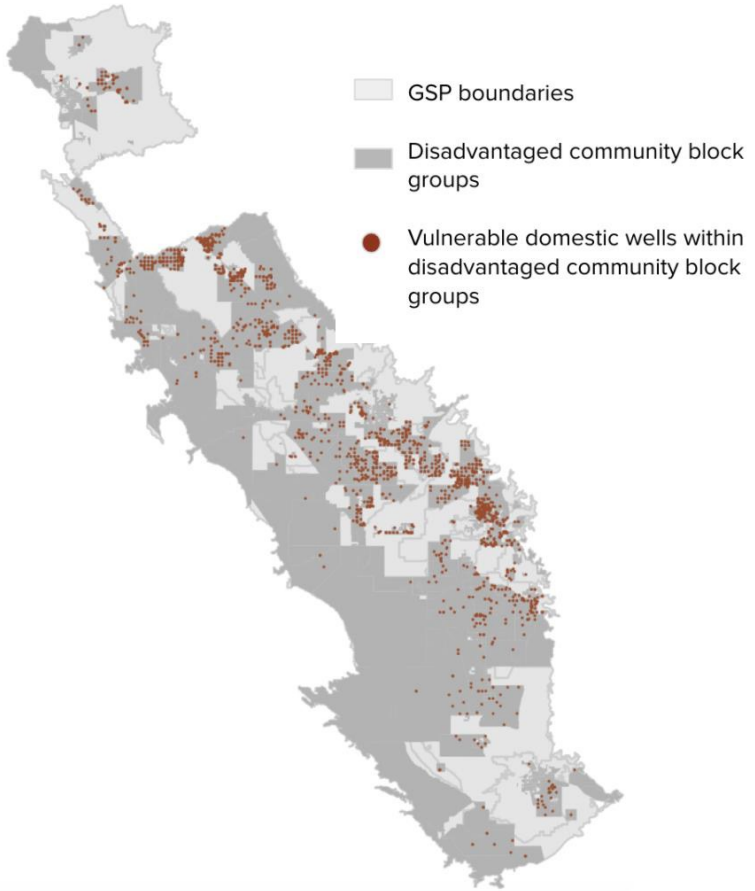
What is Environmental Justice?

"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no population, due to policy or economic disempowerment, is forced to bear a disproportionate share of the negative human health or environmental impacts of pollution or environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local and tribal programs and policies"

U.S. EPA, 1999

Study on SGMA and impacts to disadvantaged communities:

Disadvantaged block groups make up 60% of the area within submitted San Joaquin Valley Groundwater Sustainability Plans for critically overdrafted basins.


GSP boundaries
Disadvantaged community block groups
Vulnerable domestic wells within disadvantaged community block groups

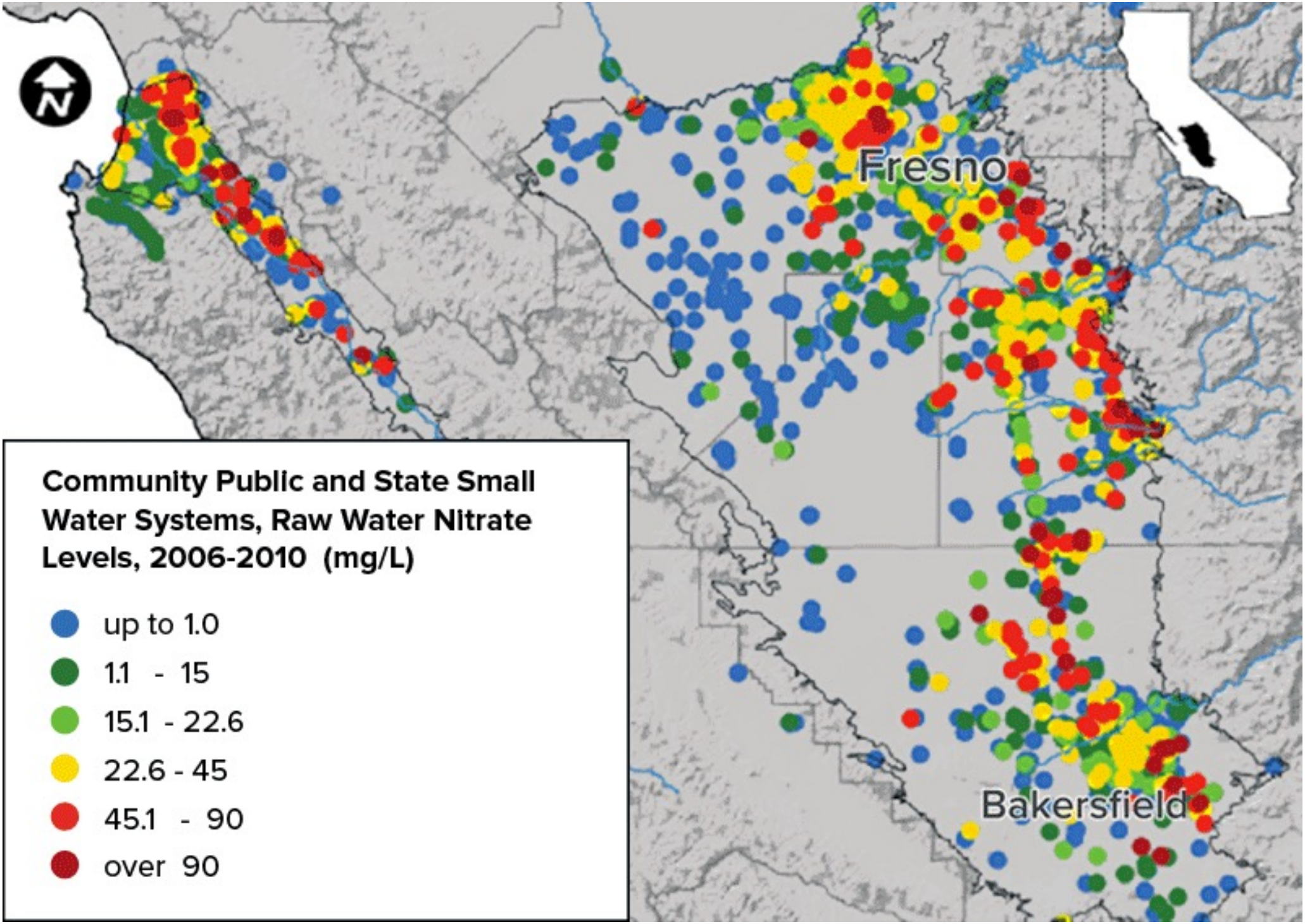
Within disadvantaged block groups., there are approximately 6,300 domestic wells completed after 1990; about 2,100 (30%) of which have pumps vulnerable to minimum thresholds – an undesirable result for groundwater overdraft. The 2,100 domestic wells comprise nearly 40% of all vulnerable wells within the San Joaquin Valley.

Drinking Water Contamination

Contaminated drinking water can cause elevated cancer rates, kidney and nervous system illness, birth defects and the erosion of teeth

Coal mining, agricultural and animal husbandry areas experience chemically polluted drinking water

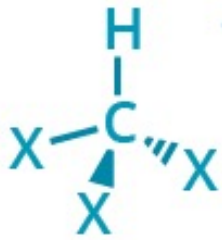
Approximately 1 in 10 Americans are exposed to chemical-polluted drinking water—NYT 2009


Fresno
Bakersfield
Community Public and State Small Water Systems, Raw Water Nitrate Levels, 2006-2010 (mg/L)
up to 1.0
1.1 - 15
15.1 - 22.6
22.6 - 45
45.1 - 90
over 90

FLINT WATER PLANT

THE FLINT WATER CRISIS

The American city of Flint, Michigan, has been in the news recently due to the discovery of very high levels of lead in its water supply. But how did this lead get there? Here's a brief explainer.



TRIHALOMETHANES

Disinfectant byproducts; formed by the reaction of chlorine (added to disinfect the water) with organic matter.

X = halogen (commonly Cl or Br)

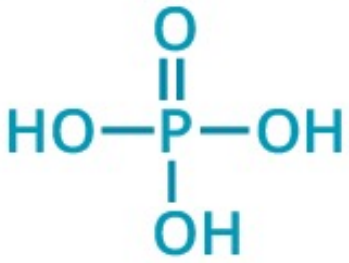
CORROSION: DETROIT VS. FLINT RIVER

0.45 DETROIT vs **1.60** FLINT

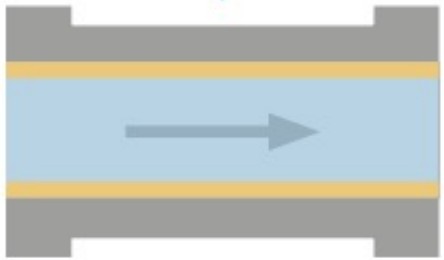
Chloride to sulfate mass ratio (CSMR); 0.45 = low corrosion; 1.60 = very high corrosion.

When high levels of trihalomethanes were detected in Flint's water, ferric chloride ($FeCl_3$) was added to improve removal of organic matter. However, this increased the water's already high concentration of chloride ions, and as a result made the water more corrosive.

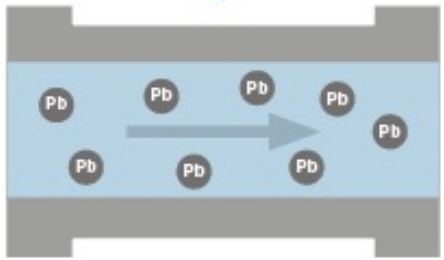
CORROSION CONTROL



WITH PHOSPHATES



WITHOUT PHOSPHATES



Orthophosphates are added to water to reduce the amount of lead leaching into it from pipes. They do this by forming a layer of low-solubility lead-phosphate complexes inside the pipe. This method of corrosion control was not used for the Flint River water supply.

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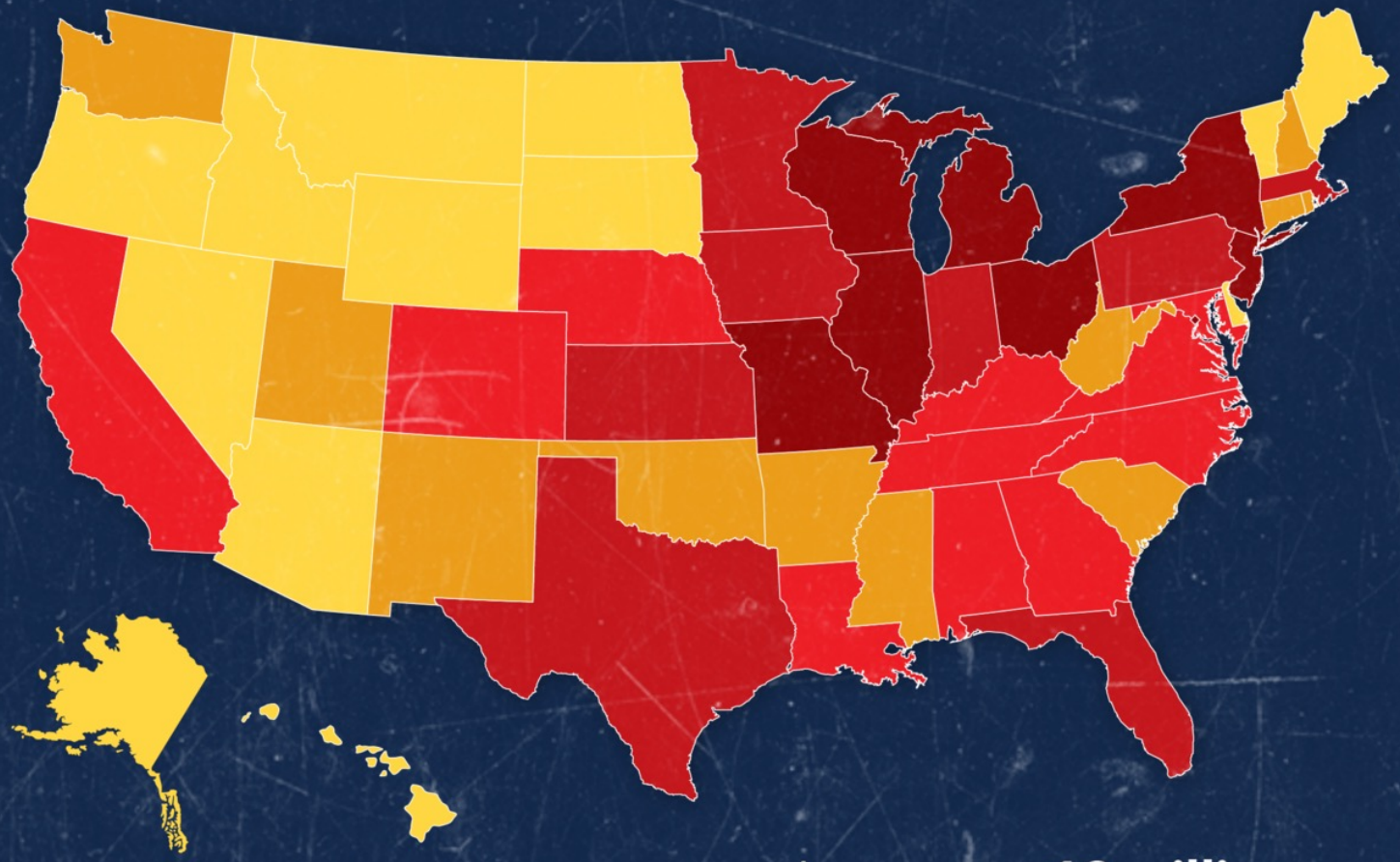
LEAD SERVICE LINES PER STATE



LEAD SERVICE LINES

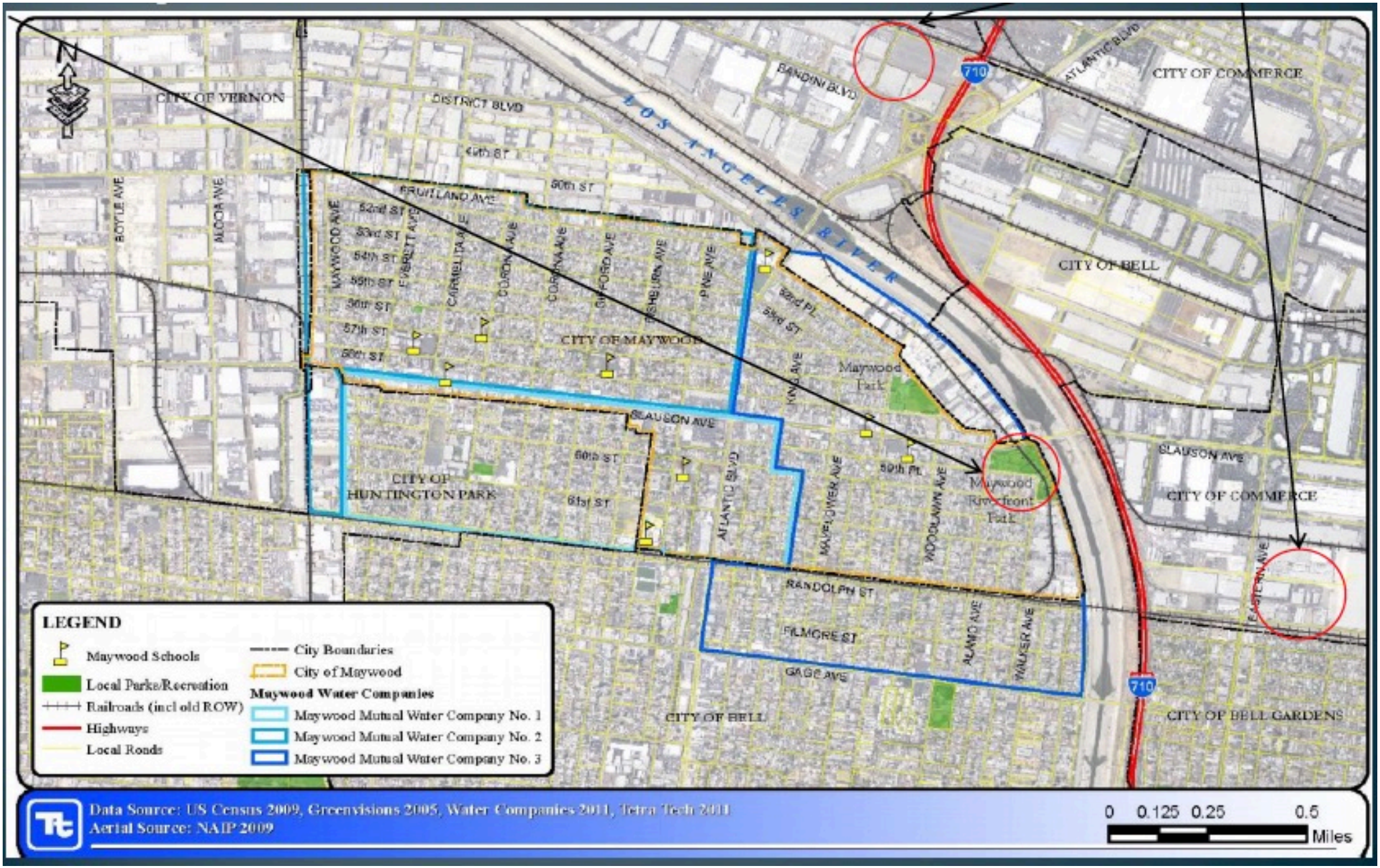
- 2,800 to 16,000
- 16,001 to 48,000
- 48,001 to 160,000
- 160,001 to 329,866
- 329,867 to 679,292

As many as **12 million lead pipes**–and possibly more–carry drinking water to the homes of up to 22 million or more people.

Maywood Water

Pemaco Superfund Site

Exide Technologies

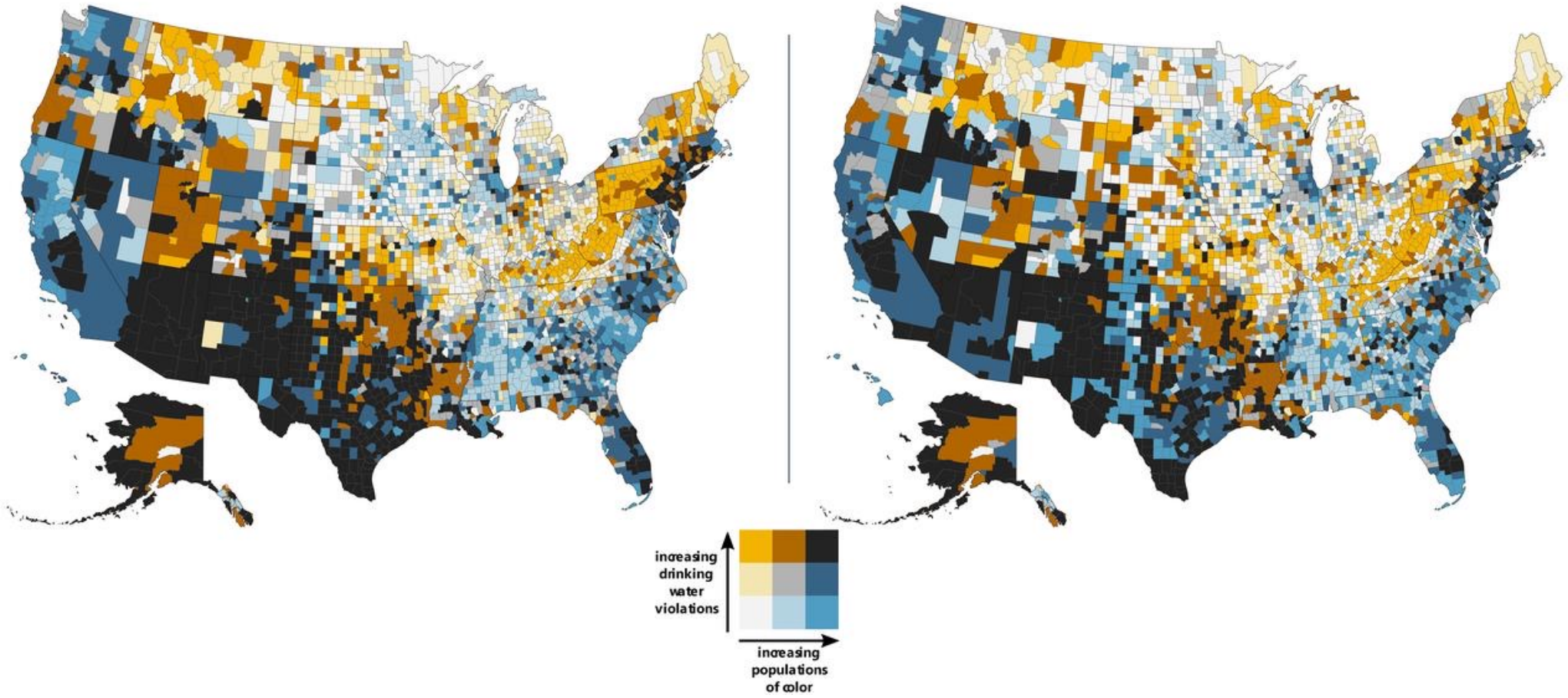


Maywood Water – Manganese Contamination

INTERSECTION OF DRINKING WATER VIOLATIONS AND RACIAL, ETHNIC, AND LANGUAGE VULNERABILITY BY COUNTY, JUNE 1, 2016 TO MAY 31, 2019.

ALL VIOLATIONS

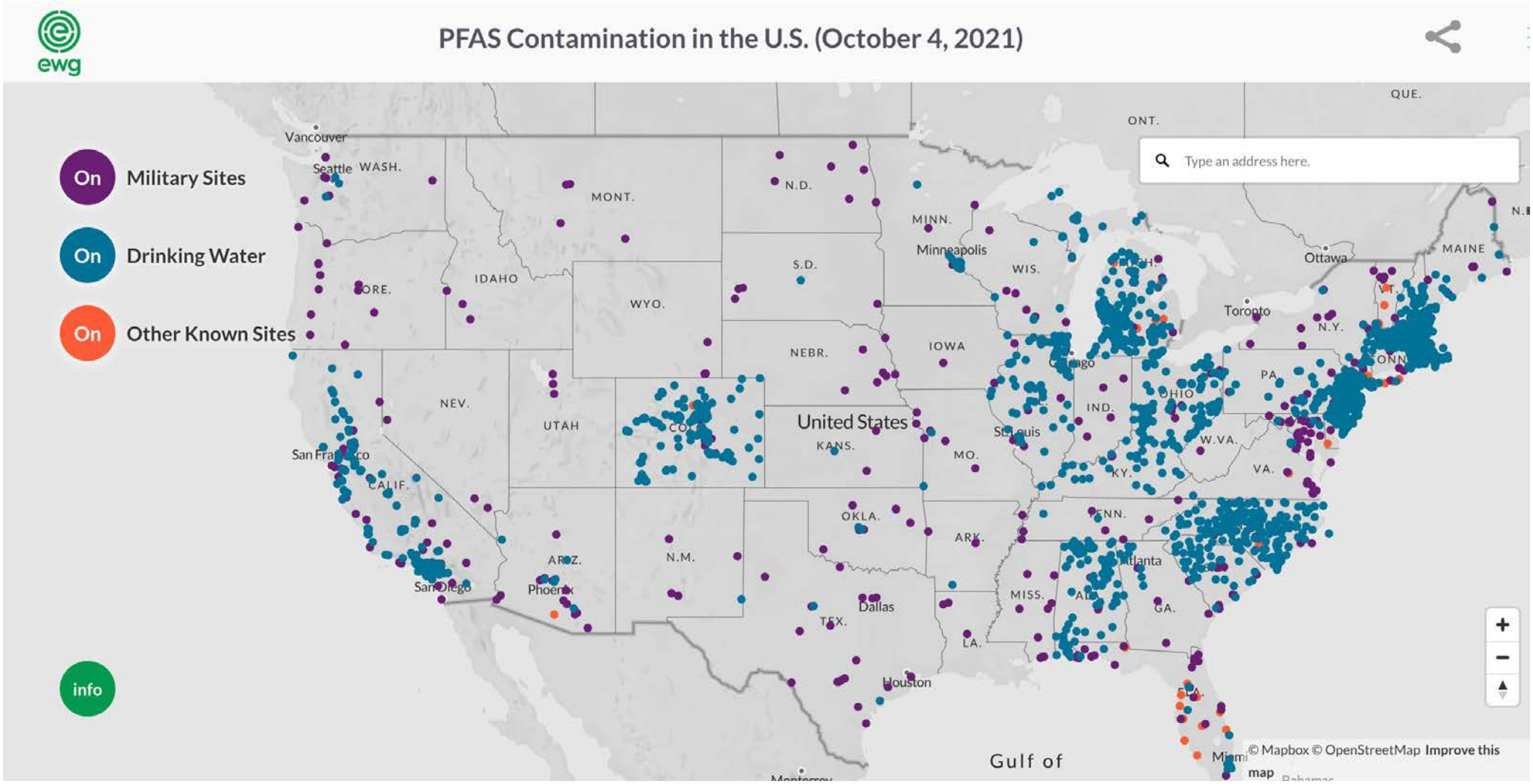
HEALTH-BASED VIOLATIONS



Fracking on tribal lands

hydraulic fracking is a process where dangerous chemicals are added to clean drinkable water & injected miles deep to fracture shale bedrock. this is done to extract
Oil & gas
three to eight million gallons of water is used per well.
TÓ ÉÍ
IINÁ!
#ENVIRONMENTALVIOLENCE

…And in Pennsylvania


ewg
PFAS Contamination in the U.S. (October 4, 2021)
On Military Sites
On Drinking Water
On Other Known Sites
info
Type an address here.
United States
Gulf of
Vancouver
Seattle
WASH.
MONT.
N.D.
MINN.
Minneapolis
S.D.
WIS.
IDAHO
ORE.
WYO.
NEBR.
IOWA
NEV.
UTAH
COLO.
KANS.
MO.
CALIF.
San Francisco
San Diego
Phoenix
ARIZ.
N.M.
OKLA.
ARK.
Dallas
TEX.
LA.
Houston
MISS.
ALA.
GA.
Atlanta
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